PATENT CLAIMS

1. A method for the reduction of nickel powder suitable as a component of refined steel, from an aqueous solution containing nickel sulphate in a pressurised space using hydrogen reduction, **characterised in that** reduction occurs continuously at a temperature between 80 - 180 °C and at hydrogen pressure between 1 - 20 bar in at least one autoclave equipped with a mixer.

2. A method according to patent claim 1, **characterised in that** reduction occurs at a temperature between 110 - 160 °C and at hydrogen pressure between 2 - 10 bar.

3. A method according to patent claim 1, **characterised in that** reduction occurs in at least one autoclave, which is divided into sections by partitions, and where each section is equipped with a mixer.

4. A method according to patent claim 3, **characterised in that** the solution surface of the slurry decreases by section in the direction of the solution flow.

5. A method according to patent claim 1, **characterised in that** reduction occurs in several autoclaves, which are arranged in series and equipped with mixers.

6. A method according to patent claim 5, **characterised in that** the autoclaves are single-sectioned.

7. A method according to any of the above patent claims, **characterised in that** the autoclaves arranged in series are both single and multi-

sectioned.

8. A method according to some of the above patent claims, **characterised in that** the autoclaves are essentially cylindrical in shape.

9. A method according to patent claim 1, **characterised in that** the nickel content of the aqueous solution containing nickel sulphate to be fed into the pressurised space is at least 30 g/l.

10. A method according to patent claim 9, **characterised in that** the nickel content of the aqueous solution of nickel to be fed into the pressurised space is at least 50 g/l, preferably at least 80 g/l.

11. A method according to patent claim 1, **characterised in that** the composition of the aqueous solution containing nickel sulphate to be fed into the pressurised space, that is the feed solution, is adjusted at the feed solution preparation stage.

12. A method according to patent claim 1, **characterised in that** a reduction catalyst is used to aid reduction.

13. A method according to patent claim 12, **characterised in that** iron (II) sulphate, $FeSO_4$, is used as reduction catalyst.

14. A method according to patent claim 12, **characterised in that** chrome (II) sulphate, $CrSO_4$, is used as reduction catalyst.

15. A method according to patent claims 11 or 12, **characterised in that** the reduction catalyst is added to the feed solution at the preparation stage.

16. A method according to patent claim 12, **characterised in that** the reduction catalyst is added to the feed solution just before the solution is fed into the pressurised space.

17. A method according to patent claim 12, **characterised in that** the reduction catalyst is fed directly into the pressurised space.

18. A method according to patent claim 1, **characterised in that** the solution to be fed into the pressurised space is neutralised at the preparation stage with ammonia so that the mole ratio becomes 1.6 - 2.4.

19. A method according to patent claim 1, **characterised in that** the nickel solution is neutralised with ammonia in the pressurised space so that the mole ratio becomes 1.6 - 2.4.

20. A method according to patent claim 1, **characterised in that** the nickel solution contains practically no ammonium sulphate.

21. A method according to patent claim 1, **characterised in that** the suspension of nickel powder and solution is removed from the pressurised space and from which suspension the nickel powder is separated.

22. A method according to patent claim 21, **characterised in that** the nickel remaining in the end solution after separation is removed by sulphide precipitation or ion exchange.

23. A method according to patent claim 21, **characterised in that** at least part of the nickel remaining in the end solution after separation is removed as a binary salt $NiSO_4{\cdot}(NH_4)_2SO_4{\cdot}6H_2O$.

24. A method according to patent claim 23, **characterised in that** when the majority of the nickel from the end solution has been recovered as a binary salt, the residual nickel is removed from the end solution either by sulphide precipitation or ion exchange.

25. A method according to patent claim 23, **characterised in that** binary salt $NiSO_4 \cdot (NH_4)_2SO_4 \cdot 6H_2O$ is dissolved in the preparation stage of the feed solution and returned as feed for the continuous hydrogen reduction of nickel in a pressurised space.

26. A method according to patent claim 23, **characterised in that** binary salt $NiSO_4 \cdot (NH_4)_2SO_4 \cdot 6H_2O$ is dissolved in the preparation stage of the feed solution and fed to the hydrogen reduction of nickel as a batch process.

27. A method according to some of the above patent claims, **characterised in that** binary salt $NiSO_4 \cdot (NH_4)_2SO_4 \cdot 6H_2O$ is dissolved using ammonia.

28. Nickel powder, **characterised in that** the powder is made by hydrogen reduction of an aqueous solution containing nickel sulphate, performed continuously in a pressurised space at a temperature between 80 - 180 °C and a hydrogen pressure of 1 - 20 bar.

29. Nickel powder according to patent claim 28, **characterised in that** a catalyst is used in reduction.

29. Nickel powder according to patent claim 28, **characterised in that** the iron content of the nickel powder is 0.1 – 2.0 %.

30. Nickel powder according to patent claim 28, **characterised in that** the iron content of the nickel powder is 0.6 – 1.4 %.